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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/399,540	09/20/1999	NENAD IVEZIC	6321-147	2387

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EXAMINER	
FERRIS III, FRED O	

ART UNIT	PAPER NUMBER
2128	16

DATE MAILED: 03/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/399,540	Applicant(s) IVEZIC ET AL.	
	Examiner Fred Ferris	Art Unit 2128	

PRS

-- Th MAILING DATE of this communication appears on the cover sheet with th correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *13-17* is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Claims 1-17 of application 09/399,540 have been presented for examination based on applicant's amendment filed 8 January 2004 (paper # 15). Claims 1-17 are currently pending in this application. Claims 1-12 remain rejected. Claims 13-17 have now been allowed.

Response to Arguments

2. Applicant's arguments filed 8 January 2004 (paper # 15) have been fully considered.

Regarding applicant's response to 103(a) rejections: Per claims 1-12: Applicants have argued that the amendment to claim 1 distinguishes the claimed invention over the prior art (Lin in view of Czarnecki) by including limitations relating to multiple manufacturing processes and user specified inputs. The examiner asserts that any manufacturing process simulation model would obviously require user specified inputs. Czarnecki teaches the input of parameters (user) into the simulation model in Figure 4 as cited in the previous office action. Further, since push and pull manufacturing planning is well-known in the art, as also previously cited, a skilled artisan would have naturally included the push and pull planning techniques (inherent in Lin) with the TACK time techniques taught by Czarnecki in order to provide a more realistic model, and hence, model multiple manufacturing processes. Accordingly, the examiner maintains the 103(a) rejection of claims 1-12. ***However, applicants are encouraged to amend independent claim 1 to include the limitations of dependent claim 3 (i.e.***

programming event groups of clock tick, resources received, and output production messages) in order to clearly distinguish the claimed invention over the prior art of record. At such time the examiner would favorable consider the entry of amendment (after final) and allowance of claims 1-12.

Per claims 13-17: The examiner withdraws the 103(a) rejection of claims 13-17 in view of applicant's arguments and the "means for" language contained in claims 13-17. (See allowable subject matter below)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. ***Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Modeling Supply-Chain Networks by a Multi-Agent System" F. Lin et al,***

Proceedings Systems Sci nc s, ISBN: 0-8186-8255-8, P105-114, Jan. 1998 in view of "Using Simulation to Schedule manufacturing Resources", H. Czarnecki, Proceedings of 1997 Winter Simulation Conference, ACM 1997.

Independent claim 1 is drawn to:
agent based manufacturing simulation steps of:
modeling manufacturing **techniques** as **push, pull,** or **takt**
associating **agent** with **process**
programming agent to respond **manufacturing events** and **trigger response**

*Regarding claim 1: Lin teaches a multiple **agent based manufacturing simulation model** where **manufacturing processes** are **modeled** via agents that are **programmed** (associated with a process) to **respond** to **manufacturing events** and **trigger** a **response**. **Push and pull** manufacturing planning is well-known and would obviously be inherent processes in Lin. (Abstract, Introduction, Figs. 1-5, Tables 1,1, Sec. 2, para1-line1-15, Sec. 4, para1-line1-7 & sub-sec. 1-4, Sec. 5, para1-line1-18, para3(all), para5(all), Sec. 6, sub-sec. 1-5, para2(all))*

Lin does not explicitly disclose modeling takt time scheduling techniques.

Czarnecki discloses the use of tack time scheduling in the simulation of planning, scheduling, and control of manufacturing system processes. The takt time defines the manufacturing process speed and cycle times for all manufacturing operations. (Abstract, Introduction, Section: 3.1, 3.2, 4.0, 5.0, Figs. 1, 3)

*It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lin relating to a multiple **agent based manufacturing simulation model** where **manufacturing processes** are **modeled** via agents that are **programmed** (associated with a process) to **respond** to*

manufacturing vents, *with the teachings of Czarnecki relating to the use of tack time scheduling in the simulation of planning, scheduling, and control of manufacturing system processes to realize the claimed invention. An obvious motivation exists since, as referenced in the prior art, simulating the manufacturing process via a programmable multiple agent architecture yields improved modeling and provides plant managers with savings in process and human resources costs.*

Dependent claims 2-7 are drawn to:
transmitting events to agent
conditioning **(programming) agent** to respond to **events** of; clock tick message, resources message, output production message
programming where:
agent places **finished output** process **in stack** (clock tick message)
agent initiates **output production using process stack** (resources message)
initiate **production if adequate resources**
agents **pass** to associated agent **upstream process** in stack in response to **event**
agents **inspect process stack** for adequate output (production message)
inspect input **stack if** stack **lacks adequate output**
request output production message (agent downstream) **if lacks resources**
agents **pass** to associated agent **upstream process** output in response to **event**
setting minimum output stack level corresponding to **process**
agent **produce replacement output** in response to output **below minimum** level
agent **compares** clock **message** with time corresponding to process and correlates
agents **place completed output in stack** corresponding to **process**
retrieve resources in stack corresponding to **associated process**
initiate production of output **using resources** contained in stack
pass agent associated with upstream process **output in stack**

*Regarding claims 2-7: Lin teaches the **transmitting** (communication) of **events** (tasks) between agents (via message passing, Sec.4, sub-sec. 1-4) where agents are **conditioned** (programmed) to perform various **tasks (events)** in response to **time stepped** scheduling (clock tick) (Sec. 5, para2-line18-22, Table 2, Sec.4, sub-sec. 1-4) of events relating to **resourc s** (inventory management) and **production** (production,*

capacity, and material planning). (Sec. 5, para5 (functions of agents)). Lin further teaches a model where agents initiate ***output production*** *based on the availability of* ***adequate resources*** *under the control of* ***distributed*** *agents relating to order management, inventory (resources), production (****output production****), capacity, material planning (resources), shop, manufacturing, and management. (Sec. 5, para5 (functions of agents))*

Lin also teaches a model where agents relate the different ***processes*** *and activities relating to production, resources, movement of materials, etc. via* ***upstream*** *and* ***downstream*** *linkages (claims 4, 5, 7). (Sec. 3, para1, line9, sub-sec. 2 (roles of entities), sec. 5 (order management agent), sec. 6 ((2) Information Sharing Strategies)))*

Claimed features relating to ***stack operations*** *(claims 3-7) such as stack* ***inspection*** *(testing for a particular quantity or value), placing values (****retrieving resources****) on/off the stake (pushing/popping), setting* ***stake levels*** *(****minimum output****), multiple stacks (****process*** *and others), etc. are simply obvious use of well known computer programming techniques and inherent to any programmed simulation (including Lin or Czarnecki).*

Independent claim 8 is drawn to:
simulation of manufacturing process via agents with steps of:
receiving message from agent relating **techniques** as **push, pull,** or **takt** identifying clock event, resources event, production event;
performing activity in response to **event**;
messaging adjacent agent in response (handshake)

Regarding independent claim 8: As previously cited Lin teaches a multiple ***agent based manufacturing simulation model*** *where* ***manufacturing processes*** *are*

modeled via agents *and further teaches agents responding to, and* ***performing an activity*** *in response to,* ***time stepped*** *scheduling (clock tick) (Sec. 5, para2-line18-22, Table 2, Sec.4, sub-sec. 1-4) of events relating to* ***resources*** *(inventory management) and* ***production*** *(production, capacity, and material planning). (Sec. 5, para5 (functions of agents)).* ***Push and pull*** *manufacturing planning is well-known and would obviously be inherent processes in Lin. Lin further teaches the* ***transmitting*** *(communication) of* ***events*** *(tasks) between agents (via* ***message passing****, Sec.4, sub-sec. 1-4) where agents are* ***conditioned*** *(programmed) to perform various* ***tasks (events).*** *It is further obvious (and inherent in cited prior art) that the* ***messaging agents*** *would respond (handshake) in response to an* ***adjacent*** *message communication. (Lin teaches message passing between agents, Sec. 4, sub-sec. 4, line 7)*

Lin does not explicitly disclose modeling takt time scheduling techniques.

Czarnecki discloses the use of tack time scheduling in the simulation of planning, scheduling, and control of manufacturing system processes. The takt time defines the manufacturing process speed and cycle times for all manufacturing operations. (Abstract, Introduction, Section: 3.1, 3.2, 4.0, 5.0, Figs. 1, 3)

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lin relating to a multiple ***agent based manufacturing simulation model*** *where* ***manufacturing processes*** *are* ***modeled*** *via agents that are* ***programmed*** *(associated with a process) to* ***respond*** *to* ***manufacturing events,*** *with the teachings of Czarnecki relating to the use of tack time scheduling in the simulation of planning, scheduling, and control of manufacturing*

system processes to realize the claimed invention. An obvious motivation exists since, as referenced in the prior art, simulating the manufacturing process via a programmable multiple agent architecture yields improved modeling and provides plant managers with savings in process and human resources costs.

Dependent claims 9-12 are drawn to:
placing finished **output in stack** corresponding process (clock event)
initiating production output corresponding to process (resources event)
passing agent upstream process **output produced**

inspecting input **stack** corresponding to process
initiating production if stack has adequate
inspecting stack corresponding to process **for adequate output**
inspecting stack corresponding to process **if lacks output**
initiating production if stack has adequate **resources to satisfy request**
posting request for production message **to agent** downstream **if lacking** resources
passing agent upstream process **output produced**
identifying minimum output corresponding **to process**
producing replacement if output **below minimum** level

comparing and correlating clock event with **time** corresponding to process
placing completed output in stack corresponding associated process
retrieving resources in stack corresponding to process
initiating production of output using resources in stack
passing to agent upstream output in **output stack**

*Regarding dependent claims 9-12: As also previously cited, Lin discloses a model where **agents** initiate **output production** based on the availability of **adequate resources** under the control of **distributed** agents relating to order management, inventory (resources), production (**output production**), capacity, material planning (resources), shop, manufacturing, and management. (Sec. 5, para5 (functions of agents)) It is obvious in a manufacturing simulation model to initiate a production output*

based on the availability of adequate resources. (see Lin Sec. 5, para5 (functions of agents))

Lin further teaches a model where agents relate the different ***processes*** *and activities relating to production, resources, movement of materials, etc. via* ***upstream*** *and* ***downstream*** *linkages (claims 4, 5, 7). (Sec. 3, para1, line9, sub-sec. 2 (roles of entities), sec. 5 (order management agent), sec. 6 ((2) Information Sharing Strategies)))*

Also as further cited, the claimed features relating to ***stack operations*** *(claims 9-12) such as stack* ***inspection*** *(testing for a particular quantity or value), placing values (****retrieving resources****) on/off the stake (pushing/popping), setting* ***stake levels*** *(****minimum output****), multiple stacks (****process*** *and others), etc. are simply obvious use of well known computer programming techniques and inherent to any programmed simulation (including Lin).*

Allowable Subject Matter

5. The following is a statement of reasons for the indication of allowable subject matter: Claims 13-17 use "mean for" language and are given deference in view of In re Donaldson and interpreted in view of 35 U.S.C. § 112 paragraph 6. The "means for" language and the limitations related thereto of claims 13-17 are interpreted within the scope of enablement as provided within the relative embodiment provided within applicant's specification.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, ***THIS ACTION IS MADE FINAL****. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).*

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, careful consideration should be given prior to applicant's response to this Office Action.

U.S. Patent 6,108,662 issued to Hoskins et al teaches simulation of manufacturing process behavior.

U.S. Patent 6,014,637 issued to Fell et al teaches agent based modeling and simulation.

U.S. Patent 6,088,689 issued to Kohn et al teaches multiple agent based process architecture.

"Multi-Agent Simulation for Balancing of Assembly Lines", I. Praca, Proceeding IEEE, 0-7803-5704-3/99, teaches agent based manufacturing simulation.

"Use of Discrete Event Simulation to Validate an Agent Based Scheduling Engine", S. Biswas, Proceedings Winter Simulation Conference 2000, P1778-1782, teaches agent based event simulation.

"Simulation-Based Production Control in the Semiconductor Industry" M. Thiel, Proceedings Winter Simulation Conference 1998, P1029-1033, teaches agent based manufacturing simulation.

"Agent-based Control of Manufacturing Systems" L. Monostori, Proceedings IEEE 1999, 0-7803-5489-3/99, teaches agent based manufacturing simulation.

"Enterprise Modeling and Simulation Platform Integrating Manufacturing System and Supply Chain" F. Kubota, Proceedings IEEE 1999, PIV-511-515, 0-7803-5731-0/99, teaches agent based manufacturing modeling.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 703-305-9670 and whose normal working hours are 8:30am to 5:00pm Monday to Friday.
Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 703-305-3900.
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March 5, 2004

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